

Six weeks later her weight was increasing and pulsation could be felt in the previously occluded vessels.

Summary

The clinical course of nine patients suffering from temporal arteritis is described. The following points emerge: the patients are without exception elderly, often of arthritic disposition, and arteriosclerotic; the disease runs a protracted though benign course but may leave permanent damage to vision; temporal arteritis is a not uncommon cause of sudden visual failure in the elderly, and the underlying disease may be overlooked if the symptoms have not been severe or if they have occurred some weeks or months before; salicylates are of value, at least in the relief of symptoms. The ischaemia of the scalp may be sufficient to result in necrosis.

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DIETARY "FIBRE"* AND PREGNANCY TOXAEMIA†

BY

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Amongst the numerous hypotheses which have been put forward from time to time to account for the cause of pregnancy toxæmia is the "dietary" hypothesis. The most consistent advocates of this have been Theobald in the United Kingdom and Dieckmann in the United States.

Despite the fact that a consideration of the possible dietary factors has so far been unproductive of conclusions on the role of any one factor in the cause of the disease, the evidence indicates that a relationship of diet with toxæmia exists. The problem is to examine all the facts where the relationship seems to exist and try to fit them into a unified pattern.

A study of the literature reveals observations which apparently cannot be reconciled. For example, Ebbs, Tisdall, and Scott (1941) found that toxæmia and the incidence of stillbirth and neonatal deaths are more common in women with "poor" diets than in those with "good" diets or in those with poor diets supplemented throughout pregnancy with oranges, tomato pulp, wheat germ, milk, and vitamin D. How are these findings to be reconciled with the observation that toxæmia is very rare in some native populations living on so-called poor diets, and also with the findings that

the incidence of eclampsia fell in Germany during the last two years of the 1914-18 war, and in the Netherlands during the 1939-45 war—that is, in periods of relative famine?

Diet and Toxaemia in Sydney

In a review of the monthly incidence of eclampsia in two hospitals in Sydney during the period 1938-45 I showed that eclampsia was more common from May to September (winter), when fruit and vegetables were scarce, than it was from November to March (summer) (Hipsley, 1949). In 1942, when there was a severe shortage of vegetables, the incidence of eclampsia was comparatively high, and the combined stillbirth and neonatal deaths reached record heights. The notion that this shortage may have contributed to the increased morbidity was strengthened by experience in New Guinea, where it was noted that native diets are predominantly vegetarian and that toxæmia is very rare. These observations suggested that there may have been a dietary factor which operated in the diet of peasant vegetarian communities and in the good diets of civilized communities but was apparently absent from poor diets of civilized communities.

Eclampsia in the Fiji Islands

In 1950 Bell and Wills noted a pronounced racial difference in the incidence of eclampsia between the indigenous Fijians and the Indians living in Fiji. In the three years 1947-9 there were 18 cases of eclampsia in 1,106 Indian confinements, while there were no cases in the same period in 717 confinements of Fijians. In 1949 there were 27 cases of pre-eclampsia in 416 Indian confinements, but no cases in 266 Fijian confinements.

The indigenous Fijians and the Indians living in the Fiji Islands are each a well-defined racial group differing widely in social, religious, and dietary habits. Such a situation seemed to offer a unique opportunity for the study of the dietary background of the disease. The staple food of the Fijian is a starchy fruit vegetable of which relatively large quantities are eaten, together with bananas, coconut, papaw, leafy greens, and small quantities of meat, fish, and crabs. The important foodstuffs in the Indian diet are flour (sharps), white rice, coconut oil, ghee, sugar, with small quantities of dhal, meat, milk, vegetables, and fruit. The bulk of this diet consists of the refined foodstuffs, white rice and flour (sharps).

A comparison of the diets of the two races shows that they differ greatly in "fibre" content (see Table I). This observation, together with the Sydney observations previ-

TABLE I.—Fibre Content of Diets of Indians Living in Fiji Compared with New Guinea Diets

Indian*				New Guinea†			
Foodstuff	g./Day/Head	Fibre‡ g./Day	Calories	Foodstuff	g./Day/Head	Fibre‡ g./Day	Calories
Bread	7.8	V.L.		Taro	106	1.80	
Sharps (flour)	317	V.L.		Sweet potato	170	1.70	
Rice, white	208.4	V.L.		Bananas	67	0.67	
Dhal	45.7	1.84		Yams	680	6.80	
Ghee	24.2	0		Pumpkin	17	0.17	
Coconut oil	35	0		Tapioca	17	0	
Potatoes	73.8	0.74		Brown rice	2.8	0.03	
Onions	3	0.06		Coconuts	39	1.24	
Sugar	54.9	0		Green leaves	2.8	0.45	
Milk	68	0		Papaw	28	0.28	
Vegetables and fruit	Small amount	V.L.		Fish	120	0	
Meat and fish	9.6	0					
Butter	3.7	0					
Total		>2.64	2,896	Total		13.14	1,600
		>0.9	1,000			8.2	1,000

* Bell and Wills, 1950.

† No quantitative assessment of Fijian diets is available. Quantitative data for Kavitaria (a village in the Trobriand Islands) have been used (see Report on the New Guinea Nutrition Survey Expedition, 1947. Department of Territories, Commonwealth of Australia, 1950.)

‡ The calculations for the fibre content of diets have been made using tables published by Nicholls (1951).
 V.L. = Very little.

*The term "fibre" as used in this paper includes lignin, cellulose, and the hemicelluloses.

†Some of this work was carried out during the tenure of a World Health Organization Fellowship in 1952, but the statements made and the opinions expressed are not necessarily those of the Organization.

ously mentioned, suggested that further evidence be sought on whether a deficiency of dietary fibre could be concerned in the causation of toxæmia.

It was of interest to find out whether the incidence of eclampsia was high in the areas from which the Indians living in Fiji had emigrated—that is, Southern India—and whether the diets were similar. Mudaliar (1938) states that there were 148 cases of eclampsia in two years at his hospital in Madras; and Indian obstetricians who have worked in Southern India are unanimous in stating that eclampsia is very common there, and much more common in the cities than in the rural areas. Dr. Sunanda Bai (1952), an obstetrician who has worked in both the southern and the northern provinces of India, states that eclampsia is much less common in the northern provinces, especially in the Punjab, "where the diet is much better balanced and contains home-pounded wheat (instead of flour), more vegetables, more fruit, and more milk." Theobald (1946) has drawn attention to the very high incidence of eclampsia in the native population of Colombo (Ceylon), where the diet pattern is very similar to that of Southern India.

On the other hand, the diet pattern of the Fijians resembles closely that of the natives of New Guinea, amongst whom toxæmia is a rare disease.

Eclampsia and the Diet of Other Native Communities

Among the natives of the Transkei eclampsia is rare. The diet consists of meal porridge, milk, eggs, and a very small amount of meat (Crichton, 1947).

From reliable authorities, all of whom have had considerable experience in medical work in various native communities, information has been collected concerning the incidence of eclampsia and the diet pattern. Professor J. H. de Haas (1952), of Leyden, said that pregnancy toxæmia was very rare in Java. There the diet consisted of crudely milled and pounded rice, starchy root vegetables, some maize, and some leafy greens. Where fish was available this was eaten. Pregnancy toxæmia was very uncommon in the Celebes according to Dr. de Wijn (1952), of Leyden. The diet consisted mainly of home-pounded rice, leafy greens, coconut, and only a small quantity of starchy root vegetables, melons, and fruit. On the coast some fish was eaten. It is noteworthy that in these communities, where toxæmia was uncommon, the diet was comparatively rich in fibre.

Trends in Eclampsia in War-stricken Countries

One of the most notable features of eclampsia is that the incidence has been observed to vary in the same geographical area, apparently as a result of a marked change in the environment. Thus a change in eclampsia incidence has been particularly noticeable in war-stricken countries. The effect of war has been by no means consistent: apparently it has sometimes been adverse and at other times beneficial.

Hong Kong.—King and Ride (1945) reported that in Hong Kong in 1940–1 there was a striking increase in the incidence of eclampsia, reaching almost epidemic proportions. This coincided with a serious outbreak of beriberi. Eclampsia

TABLE II.—Showing Correlation of Fibre Content of Diet with Incidence of Eclampsia or Pregnancy Toxaemia

Group	Description of Diet	Dietary Fibre Grading*	Eclampsia† or Toxaemia	Authority
New Guinea natives	Starchy roots, green leaves, nuts, fruit, plus small amounts of fish and meat	++++	0	Hipsley (1949); Bell and Wills (1950)
Fijians	Home-pounded wheat, starchy roots, pumpkin, fruit, plus a little milk	++++	+	Bai (1952)
Transkei (South Africa)	Meal porridge, milk, eggs, and small amount of meat	++++	0	Crichton (1947)
Java	Home-pounded rice, green leaves, maize, starchy roots, little fish	++++	+	de Haas (1952)
Celebes	Home-pounded rice, greens, coconut. Small amounts of vegetables, melons, and fruit	++++	+	de Wijn (1952)
Indians (Fiji)	Polished rice, flour (sharps), ghee, coconut oil, dhal. Small amounts sugar, meat, and vegetables	+	++++	Bell and Wills (1950)
Indians (South India)	Ditto	+	++++	Mudaliar (1938); Bai (1952)
Colombo	Ditto	+	++++	Theobald (1930)
Europeans (Toronto) "poor" diet group	Inexpensive high-energy-yielding foods. Minimum of "protective" fruit and vegetables which are more costly	Increased	Reduced	Ebbs, Tisdall, and Scott (1941)
Europeans (Toronto) "good" diet group	Increased consumption of fruit and vegetables	↓	↓	

TABLE III.—Showing the Apparent Effect of a Change in Fibre Content of the Diet on the Incidence of Eclampsia or Toxaemia

Group	Period of Change	Dietary Change	Dietary Fibre Grading*	Eclampsia† or Toxaemia	Authority
Hong Kong	1939	Mixed diet	+++	++	King and Ride (1945)
	1940–1	To polished rice	+	+++	
	1945	To mixed diet	+++	++	
Netherlands	1940	Mixed diet (70% extra bread)	++	Reduced	Holmer (1947)
	1944	To food shortage (90% extra bread) and starchy roots and vegetables	++++	↓	
	1945	To relief of famine, refined high-calorie foods (70% extra bread)	++	Increased	
Scotland	1939	Mixed diet containing 70% extra bread	++	Reduced	Baird (1952)
	1942 <i>et seq</i>	To 85% extraction bread and more vegetables	+++	↓	
Sydney	1939	Mixed diet	+++	+	
	1942	To acute shortage of vegetables	++	++	
	1943	To normal mixed diet	+++	+	
"	Summer	Mixed diet containing moderate fruit and vegetables	+++	Increased	Hipsley (1949)
	Winter	To reduced consumption of fruit and vegetables	++	↓	
"	Control of weight gain in pregnancy	Restriction of concentrated high-energy foods	++	++	Hamlin (1952)
		With increased consumption of fruit and vegetables	+++	0	

* Fibre grading (approximate): +++++ Very high=above 4 g./1,000 cals. ++++ High=2–4 g./1,000 cals. ++ Moderate=1–2 g./1,000 cals. + Low=below 1 g./1,000 cals.

† Incidence of eclampsia (approximate): +++++ Very high=8 eclamptics/1,000 deliveries. +++ High=2–8 eclamptics/1,000 deliveries. ++ Moderate=1–2 eclamptics/1,000 deliveries. + Low=below 1 eclamptic/1,000 deliveries. 0 Absent or very low.

was particularly common in the beriberi cases, and Browne (1944) has commented that the data of King and Ride show that eclampsia was 50 times more common in women with beriberi than in those without it. On the other hand, vitamin B₁ has proved valueless either in the prevention or in the treatment of the disease. It is of interest to examine the changes in diet which resulted in this increase of beriberi. King and Ride state that there was a change from a relatively mixed diet to one of polished rice, owing to an influx of refugees from war areas, with consequent poverty and overcrowding of the city. After the war the eclampsia had declined to the original 1938 level, and the beriberi incidence had declined also (King, 1947). Burgess (1952) has pointed out that since the war less white rice has been available in Hong Kong. The change in the fibre content of the diets of Hong Kong would seem to run parallel with the change in the incidence of eclampsia.

Netherlands.—Contrary to experience in Hong Kong, the impact of war apparently had a beneficial effect on the incidence of eclampsia. Holmer (1947) and Duncan, Baird, and Thomson (1952), the latter using data supplied by Posthuma and others, have reported that the incidence of toxæmia fell in the Netherlands from 1940 to 1945, but rose again after the war to almost its pre-war level. Holmer states that in Holland during the food shortages pregnant women did remarkably well. There were few cases of eclampsia, but immediately after the relief of the famine he saw seven cases, three of which were fatal. The first food distributed to the starved population had a high caloric value, and consisted mainly of fats, protein, and sugar; it was also very salty. During the war the diet pattern in the Netherlands altered as food became scarcer. Bread, which before the war was made from 70% extraction flour, was made from flour which at times was 90–95% extraction; turnips and potatoes became much more prominent in the diet; and in 1944, during the worst period of famine, even linseed meal, tulip bulbs, and sugar beets were eaten. There is no doubt that the fibre content of the diet increased from 1940 to 1944 and has decreased again since that date.

Scotland.—Duncan, Baird, and Thomson (1952) have shown that in Scotland from 1943 onwards a steady and considerable fall occurred in the stillbirth rates resulting from toxæmia. This fall they attributed to "improvement from 1941 onwards in the efficiency of the physiological mechanisms which govern the growth and vitality of the foetus." They thought the improvement was unlikely to have been due to better antenatal care, but was probably due to improved economic conditions, assisted by the effects of scientific rationing. An important widespread change in the diet was the change from 72% extraction bread to 85% early in 1942. The fibre content of 70% extraction flour is negligible, while that of 85% extraction is 1%. This single change in bread, a staple foodstuff, would have brought about a widespread increase in the fibre content of the diet from approximately 1.2 g. per 1,000 calories to 2.4 g.

Effect of Control of Weight Gain in Pregnancy

Hamlin (1952) published the results of a three-year attack on eclampsia at the Crown Street Women's Hospital in Sydney. He claims that eclampsia has virtually been eliminated by changing the diet from a "high-carbohydrate, low-protein diet to a low-carbohydrate, high-protein, high-vitamin diet before mid-pregnancy." These measures were coupled with increased antenatal supervision and control of excessive weight gain in mid-pregnancy by dieting. The dietary changes advocated by Hamlin would have the effect of increasing the intake of fibre. Especially is this so in the case of diets designed to limit weight gain in pregnancy, where the restriction of the concentrated high-calorie foods such as flour, sugar, and fats is countered by an increased intake of the more bulky but less fattening fruits and vegetables.

In assessing Hamlin's results it should be noted that eclampsia—that is, the actual occurrence of fits—can often be prevented by careful supervision and treatment of tox-

aemia patients. In other words, the incidence of eclampsia is susceptible to antenatal care, and does not always bear a true relationship to the incidence of toxæmia, especially where there is a high standard of obstetric service. Baird (1952) is of the opinion that the combined stillbirth and neonatal death rate has a much closer relationship with the true toxæmia incidence, because these morbid conditions are so often the result of toxæmia. Unfortunately Hamlin does not give evidence on the incidence of toxæmia (without eclampsia) or on the combined stillbirth and neonatal death rates.

Toxaemia in Poor and Good Diets of Urban Communities

One of the characteristic features of poor urban diets is that people tend to satisfy hunger with concentrated energy-producing foods which are cheap, whilst neglecting the more costly "protective" foods, such as fruit and vegetables. These foods, in addition to being rich in minerals and vitamins, also contain fibre. Ebbs, Tisdall, and Scott (1941) demonstrated that good diets and poor diets, supplemented with a number of fruits and vegetables (see above), apparently had a beneficial effect on the incidence of toxæmia. These diets undoubtedly had a higher fibre content than the poor diets.

In review, most of the above observations relating diet to the incidence of pregnancy show that toxæmia is more common where the fibre content of the diet is low. The evidence for this is summarized in Tables II and III.

Summary

The incidence of pregnancy toxæmia in various groups of people consuming widely different diets, together with observations of trends in the incidence of this disease in the same group of people but at different periods (such as during wartime), has been discussed.

The suggestion is made that some factor or factors associated with the "fibre" content of the diet tend to inhibit the occurrence of toxæmia.

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From the *Gentlemen's Magazine*, August, 1853: "The Royal Family has been suffering from measles. It first appeared on H.R.H. the Prince of Wales, who in consequence was absent from his brother's [Prince Leopold's] christening. On July 8 it was announced that Prince Albert [Prince Consort] was attacked, and on the 19th that Her Majesty also had the complaint. Meanwhile all the royal children except the first have successively taken the infection. The whole Royal Family have passed through the disease very favourably. On July 6 the foundation stone of the Medical Benevolent College was laid in Epsom . . . H.R.H. Prince Albert, who had promised to lay the stone, was absent from illness."